# AN ANALISIS OF TRAFFIC ACCIDENT DEATHS IN A HOSPITAL IN JAKARTA.

**Supardi Praptasuganda* and Hermansyur Kartowisastro****


## ABSTRAK

Dari 107 penderita kecelakaan lalu lintas yang dirawat dan meninggal di RS. DR. Cipto Mangunkusumo di Jakarta, 1984, 37% adalah pejalan kaki dan 36% adalah pengendara atau penumpang sepeda motor. Paling sedikit 65% dari kasus yang meninggal, kalau tidak semuanya, menderita cedera kepala dan 70% meninggal dalam waktu 2 hari setelah perawatan. Kematian pejalan kaki cenderung meningkat dengan meningkatnya usia dan hampir 50% disebabkan oleh karena tertabrak mobil. Pemakaian helm kepala bagi pengendara dan penumpang sepeda motor, sabuk pengaman bagi pengemudi dan penumpang kendaraan bermotor lain dianjurkan untuk mencegah terjadinya cedera kepala. Diperlukan lebih banyak sarana pencegahan pasif untuk melindungi pejalan kaki.


## INTRODUCTION.

In 1984 the city of Jakarta had a population of 7.5 million[1], and 1.2 million registered motor vehicles, of which 57% were motorcycles, excluding those that belong to the diplomatic corps and the armed forces. The Jakarta Metropolitan City Police Department reported that between 1978--1983 there were 514 traffic accident deaths, with a range from 416 to 676, each year in the city. The Forensic Department of the School of Medicine University of Indonesia which received almost all deaths on the street every day for legal certification on the cause of death, however, recorded 988 traffic accident deaths in 1984. Based on this figure which was considered as a figure closer to the reality this means that in Jakarta there were about 3 traffic accident deaths every day. Police data further showed that between 1978 and 1983 the everage annual increase of motor vihicles was 12%, but during the years 1981 and 1982 the increase was 15%. Within the 6 years period of 1978--1983, 7.6% of all traffic accidents each year had a fatal outcome. In 1982 the proportion of fatal accident went up to even more than 9%. Throughout Indonesia, traffic accident patients occupy 10% of the total occupied beds in the hospitals[2]. From the above figures it is clear that traffic accident is a serious health problem and in the future will become even more so in Jakarta as well as in Indonesia. This study will describe the epidemiology of traffic accident cases who were admitted into the DR. Cipto Mangunkusumo general hospital in Jakarta.

## MATERIAL AND METHODS.

A case was defined as a person injured by a traffic accident, admitted into the DR. Cipto Mangunkusumo general hospital in Jakarta and died. The period of the study was 1984. The DR. Cipto Mangunkusumo general hospital was chosen because most of the traffic accident cases in the city were brought in or referred to by other hospitals and centers which had less adequate facilities.


*. Non Communicable Diseases Research Center, NIHRD, Ministry of Health - Indonesia.
** Chief, Emergency Unit DR. Cipto Mangunkusumo Hospital.

With limited resources available it was not possible to look into hospital records of all cases. Instead, data were collected from abstract cards prepared by the staff of the hospital medical record department. One card contains information of more than one patient but share the same external cause of injury (E code, ICD 9th rev). Information of the patient on this card includes the name, file number, sex, age group (<1, 1—4, 5—14, 15—44, 45—64, 65+) and the coded diagnosis of the injury. The color of the cards of those who died and those who did not died at the time of discharge were different. All cards of those who died and coded with E 810.0 up to 819.9 at the upper right corner were taken. During the early stages of data processing there was suspicion that some coded information of the cause of injury and the person involved in the accident (driver, passenger or pedestrian) may have been inaccurate. This has led to additional effort of going back to the original documents. Only 70% of the documents could be retrieved from the file. Mistakes found in the coding were corrected accordingly on the data collected. On many patient records, no clear description was given of the accident especially of those who were referred by another hospital. Also very often no clear distinction was made by the first recorder between a motorcyclist and its passenger or a driver and passenger of a motor vehicle other than a motorcycle. Therefore in the analisis, these persons were grouped together. There was an intention also to collect the cause of death from death certificates in the hospital. However because only a few of the certificates could be retrieved and some of them were not well completed the cause of death was not included here.

## RESULTS.

In 1984 there were 1712 traffic accident cases admitted in the DR. Cipto Mangunkusumo General Hospital, of which 107 died, a case fatality rate of 6.3%. Only 7 of the 10 listed classification of motor vehicle traffic accidents (MVTA) as the external cause of injury (E 810 — 819) were identified. Collision with train (E 810), reentrant collision with another motor vehicle (E 811) and other MVTA involwing collision on the highway (E 815) were not found. Very unfortunate that 41 of the 107 cases (38%) belong to MVTA of unspecified nature (E 819). From the study into the original patient documents it was noted that in at least 19 of those 41 cases, the accident was only described as either "Traffic Accident" or "Referred by a hospital". If the 41 cases of E 819 were excluded from the total number of cases, then 45% of the fatal accidents were MUTA involving collision with a pedestrian (E 814). This was the most frequent type of motor vehicle traffic accident. It was followed by MVTA involving collision with another motor vehicle (26%), Non collision MVTA while boarding or alighting and Other non collision MVTA (Tabel 1).

When the person involved in the accident was analyzed, one can see in Table 2 that the most frequent person died were pedestrians (37%). The next frequent person was either the motorcyclist or its passenger (35.6%), followed by the driver of passenger of a motor vihicle other than motorcycle.

The highest number of the cases were found in the 25 — 44 years age group (39.2%) followed by age group 15 — 24 years (24.5%) and 45—64 years (21.6%). Below and above these age groups, the number of cases dropped substantially (Table 3). There were more deaths in males compared to females with a ratio of 4 : 1.

Although the diagnosis of the injuries of 37 persons (34.6%) were not available, but from the remaining 69 person it was possible to conclude that at least 65% of the cases had suffered from brain injury (Table 4) which most probably may also have caused their death.

Tabel 1. **Fatal traffic accidents by type of accident, Dr. Cipto Mangunkusumo Hospital, 1984**

| Type of Accident | E code | # | % |
|---|---|---|---|
| 1. Other MVTA * involving collision /w another motor vehicle | 812 | 17 | 25.8 |
| 2. MVTA involving collision w/other vehicle | 813 | 4 | 6.1 |
| 3. MVTA involving collision w/pedestrian | 814 | 30 | 45.4 |
| 4. MVTA due to lose control, w/h collision on the highway. | 816 | 1 | 1.5 |
| 5. Non collision MVTA while boarding of alighting. | 817 | 9 | 13.6 |
| 6. Other non collision w/other | 818 | 5 | 7.6 |
| Sub Total | | 66 | 100.0 |
| 7. MVTA of unspecified nature | 819 | 41 | |
| Total | | 107 | |

* MVTA = Motor Vehicle Traffic Accident

Tabel 2. **Fatal traffic accidents by person involved, Dr. Cipto Mangunkusumo Hospital, 1984**

| Person Involved | # | % |
|---|---|---|
| 1. Driver or passenger of motor vehicle other than motorcycle | 14 | 19.2 |
| 2. Motorcyclist or passenger of motorcycle | 26 | 35.6 |
| 3. Pedal cyle | 2 | 2.7 |
| 4. Pedestrian | 27 | 37.0 |
| 5. Other Specified persons | 4 | 5.5 |
| Sub Total | 73 | 100.0 |
| 6. Unspecified person | 34 | |
| Total | 107 | |

**TABEL. 3 Traffic accident deaths by age group, Dr. Cipto Mangunkusumo Hospital, 1984**

| Age Group (yrs) | # | % |
|---|---|---|
| < 1 | 0 | 0 |
| 1 — 4 | 0 | 0 |
| 5 — 14 | 6 | 5.9 |
| 15 — 24 | 25 | 24.5 |
| 25 — 44 | 40 | |
| 45 — 64 | 22 | 21.6 |
| 65 + | 9 | 8.8 |
| Sub total | 102 | 100.0 |
| N. A. | 5 | |
| Total | 107 | |

Of those 4 cases with concussion, three had other injuries as well, one with intracranial injury (853), one with fracture of the base of skull (801) and the other one with injury to other intra abdominal organs (866).

Seventy percent of the patients had died within the first 2 days after hospital admission (Table 5). Of the 54 cases who died wihtin 1—2 days, 43 cases (40%) were hospitalized for only 1 day. The median value of hospital days was between 1 and 2 days.

Of the 17 fatal accidents involving collision of motor vehicle with another motor vehicle, at least 11 accidents (65%) involve a motorcycle (Table 6). Five of the 11 motorcycle accidents were accidents between a motorcycle and a truck (45%).

**Tabel 4. Diagnosis of injuries among traffc accident deaths, Dr. Cipto Mangunkusumo Hospital, 1984**

| Diagnosis | # | % |
|---|---|---|
| 1. Concussion (850) * | 4 | 5.8 |
| 2. Cerebral laceration and contusion (851) | 60 | 87.0 |
| 3. Subarach, subdural and extradural haemorage following injury ( 852 ) | 5 | 7.2 |
| Sub total | 69 | 100.0 |
| 4. N. A. | 38 | |
| Total | 107 | |

* ICD 9 th rev diagnosis code.

**Tabel 5. Traffic accident deaths by length of stay, Dr. Cipto Mangunkusumo Hospital, 1984**

| Lenght of Stay ( days ) | # | % |
|---|---|---|
| < 1 | 21 | 19.6 |
| 1 — 2 | 54 | 50.5 |
| 3 — 4 | 13 | 12.1 |
| 5 — 10 | 14 | 13.1 |
| 11 + | 5 | 4.7 |
| Total | 107 | 100.0 |

Among pedestrian deaths, 48% of the injury was caused by automobile and 32% by a motorcycle. They were the two most prevalent causes of injury among pedestrians (Table 7). The highest number of deaths were found in the 25—44 years age group followed by the age group of 45—64 years (Table 8).

## DISCUSSION

The results of this study revealed that the most frequent type of fatal accidents were between motor vehicles and pedestrian (45.5%) followed by accidents between two motorvehicles (25.8%) of which in at least 65% of the accidents a motorcycle was involved. Deaths were common among pedestrians and among motorcyclist or its passenger. In 1981, based on police records in Jakarta, 48% of 65 deaths accured during a period of one month were inflicted by pedestrians[3]. Earlier study in 1978 also showed that 45% of traffic accidents patients brought into the emergency room of DR. Cipto Mangunkusumo general hospital in Jakarta, were the result of accidents between pedestrians and motorized vehicles[4]. Based on current and past records it is apparent that pedestrians and riders of motorcycles posed the highest risk of deaths in traffic accidents.

There is a 4x preponderance of males over females which is in accordance with the male female ratio of traffic accidents cases in the emergency room of DR. Cipto Mangunkusumo hospital in 1978[4].

**Tabel 6. MVTA accident involving collision with another motor vehicles (E 812) by type of motor vehicle involved, Dr. Cipto Mangunkusumo Hospital, 1984.**

| Tye of motor vehicle involved | # | % |
|---|---|---|
| 1. Motorcycle and motorcyle | 3 | 27.3 |
| 2. Motorcycle and automobile | 2 | 18.2 |
| 3. Motorcycle and truck | 5 | 45.4 |
| 4. Motorcycle and unknown motor vehicle | 1 | 9.1 |
| Sub Total | 11 | 100.0 |
| N. A. | 6 | |
| Total | 17 | |

**Tabel. 7. Pedestrian deaths by type of motor vehicle involved, Dr. Cipto Mangunkusumo Hospital, 1984.**

| Type of motor vehicle involved | # | % |
|---|---|---|
| 1. Pedestrian hit by automobile | 12 | 48 |
| 2. Pedestrian hit by motorcycle | 8 | 32 |
| 3. Pedestrian hit by truck | 3 | 12 |
| 4 Pedestrian hit by bus | 2 | 8 |
| Sub Total | 51 | 100.0 |
| 5. Pedestrian hit by unkonwn motor vehicle | 2 | |
| T o t a l | 27 | |

**Tabel. 8 Pedestrian deaths by age group. Dr. Cipto Mangunkusumo Hospital, 1984**

| Age group ( years ) | # | % |
|---|---|---|
| < 1 | 0 | — |
| 1 — 4 | 0 | — |
| 5 — 14 | 3 | 12.5 |
| 15 — 24 | 3 | 12.5 |
| 25 — 44 | 10 | 41.7 |
| 45 — 64 | 6 | 25.0 |
| 65 + | 2 | 8.3 |
| Sub total | 24 | 100.0 |
| Unknown | 3 | |
| T o t a l | 27 | |

The age pattern of accident fatality showed that 64% were among the 15 — 45 age group, and more deaths were in the 25 — 44 years compared to 15 — 24 years. In Ny. Tanti Santoso's study of police data, it showed the reversed sequence[3]. There is a tendency that more traffic accident deaths occurred among the productive age group of people. Among pedestrians, 67% were in the age group of 25 — 64 years. The tendency that more deaths among pedestrians were found among older people support the findings in the USA[5].

Of the 107 traffic accident deaths, at least 64.5% had suffered from brain injury. This was most likely due to collision with hard or solid surfaces. The severity of the injury was the result that 70% of the patients died within the first two

days of hospitalization.

In at least eleven of the 17 fatal cases between two motor vehicles, a motorcycle was involved. There is an impression that fatal accidents caused by collision between a motorcycles and a truck were frequent, less between two motorcycles or with an automobile. Studies in New Delhi, India also concluded that highest fatal injuries were caused by collision between two-wheelers and buses or trucks (pers. comm). In Jakarta, more pedestrian deaths were caused by automobile compared to other types of motor vehicles despite that 57% of motor vehicles in Jakarta were motorcycles. This finding is in accordance with the data of 1981 – 1982 from Sumargo's study[6].

Over the past few years, the pattern of fatal traffic accidents have not changed and that brain injury is the major cause of death. More attention needs to be given to protect the head of riders on motorcycles and pedestrians since they are the two most frequent persons dying from traffic accidents. In general, prevention and reduction of fatal outcomes of injuries could be accomplished by reducing the damaging effect of energy exchanges by the application of Haddon's "Ten strategies for injury control"[7]. Preventive measures for pedestrians, among others, should be aimed at passive protective measures such as 1) the provision of more pedestrian walkways which are safe and well protected from the traffic, 2) the provision of sufficient places to cross a road (zebra cross or pedestrian over/underpasses) which could be utilized without inconvenience, 3) effective barriers to prevent pedestrian from crossing roads at dangerous areas.

The importance of using helmets for riders of motorcycles (motorcyclist and/or passenger) which has reduced 30% of motorcycle deaths in the USA[5,8] should be re-emphasized. The use of helmets for motorcycle riders in Jakarta and some other large cities in Indonesia have been partially implemented by the police departmen since 1985. However, there are still many who did not realize the beneficial effect of helmet usage. Their objections are about the discomfort when used. Thus, it is important to develop a type of helmet suitable to use in the tropics but maintain its protective value for the users.

There is also a high percentage of deaths among drivers or passengers of motor vehicles other than motorcycles in this study (19.2%). Among other methods of prevention, the use of lap shoulder belt which decreases the abruptness of deceleration has been shown to reduce the chances of deaths in a crash by about 50% 5,7. At present there are no standard regulations that would require automobile assemblers to install seat belts in automobiles, but almost all types of passenger cars made in recent years have one installed together with a head restrain for the front seats. However one can observe easily on the street extremely few front seat occupants of motor vehicle use the belt. Since this instrument could save many of the users life in a collision, it is worthwhile to consider a national law for its implementation.

The drawback in this study is the high number of partly missing information of variables which has prevented the drawing of optimal conclusions because of the small numbers involved. Although the 107 cases after divided into different categories of accidents were small, it is hoped that the result could be used as a base for more extensive study on how, when and where these fatal accidents happened, and to find more specific recommendations for prevention.

## SUMMARY

Of 107 traffic accident cases admitted and died at the DR. Cipto Mangunkusumo general hospital in Jakarta in 1984, 37%

were pedestrians and 36% were riders or passengers of motorcycles. At least 65%, if not all, had suffered from brain injury and 70% died within the first 2 days of admission. Pedestrian deaths tend to increase at older ages and 50% were caused by automobile. The use of helmets for motorcyclist and passenger, car seat laphoulder belts for driver and passenger of other motorvehicle is recommended to prevent brain injury. More passive protective facilities is needed for pedestrians.
(Traffic accident deaths epidemiology).

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